

CLAIMS

1. An LED illumination source device for use in a flow particle detection device comprising:
 - an LED for providing light at a selected wavelength; and
 - an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.
2. The device of claim 1, wherein the optical element comprises:
 - a collecting element having a small focal length for collecting the light from the LED and substantially collimating it to a roughly parallel beam of light; and
 - a focussing element for focussing the collimated beam.
3. The device of claim 1 wherein the collecting element is a ball lens.
4. The device of claim 1 wherein the LED is a composite LED which generates light at two wavelengths.
5. The device of claim 1 wherein the LED is a side emitting, flat pack, lenseless LED.
6. The device of claim 1 wherein the flow particle detection device is a flow cytometer.

7. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;
an illumination device for illuminating the sample stream within the flow zone; and

a detector assembly for detecting light emitted or scattered from illuminated target particles within the flow zone;
wherein the illumination device includes an LED illumination source device including -

an LED for providing light at a selected wavelength; and
an optical element for collecting nearly all of the light from the LED and concentrating the collected light at a selected volume within a flow sample stream.

8. The apparatus of claim 7 wherein the optical element comprises:
a collecting element having a small focal length for collecting nearly all of the light from the LED and substantially collimating it to a parallel beam of light; and
a focussing element for focussing the collimated beam.

9. The apparatus of claim 8 wherein the collecting element is a ball lens.

10. The apparatus of claim 7 wherein the LED is a composite LED which generates light at two wavelengths.

11. The apparatus of claim 10 wherein the detector detects light

emitted or scattered from illuminated target particles resulting from illumination at both selected wavelengths within the flow zone.

12. The apparatus of claim 11, wherein the sample stream includes two fluorescent dyes and the selected wavelengths cause the two dyes to emit at different wavelengths.

13. The apparatus of claim 7 wherein the particle detection apparatus is a flow cytometer.

14. The apparatus of claim 13, wherein the particle detection apparatus is a flow cytometer.

14. Particle detection apparatus for identifying particles in a sample stream moving through a flow zone, the sample stream containing target particles, the apparatus comprising:

equipment for passing the sample stream through the flow zone;

an illumination device for illuminating the sample stream within the flow zone with two selected wavelengths; and

a detector assembly for detecting light emitted or scattered from illuminated target particles resulting from illumination at both selected wavelengths within the flow zone;

wherein the illumination device includes an LED illumination source device including -

an LED for providing light at the two selected wavelengths; and

an optical element for collecting nearly all of the light from the

LED and concentrating the collected light at a selected volume within a flow sample stream.

15. The apparatus of claim 14, wherein the detector assembly comprises two detectors for detecting emitted light at two wavelengths.

16. The apparatus of claim 14, wherein the sample stream includes two fluorescent dyes and the selected wavelengths cause the two dyes to emit at different wavelengths.

17. The apparatus of claim 16, wherein the detector assembly comprises two detectors for detecting emitted light at the two wavelengths.

18. The apparatus of claim 14 wherein the optical element comprises:

a collecting element having a small focal length for collecting nearly all of the light from the LED and substantially collimating it to a roughly parallel beam of light; and a focussing element for focussing the collimated beam.

19. The apparatus of claim 18 wherein the collecting element is a ball lens.

20. The apparatus of claim 14 wherein the particle detection apparatus is a flow cytometer.